

IV. DESCRIPTION AND TECHNICAL ASSESSMENT OF THE COATING CATEGORIES AND SOLVENTS

A. INTRODUCTION

To ensure that the proposed SCM is technologically and commercially feasible, we considered the following:

- 1) The results of the 2002 Automotive Coatings Survey;
- 2) Information from automotive coating manufacturers, solvent suppliers, and other industry groups;
- 3) The existing VOC limits for automotive coatings and solvents; and
- 4) The results of our technical analyses of all the coating categories proposed in the SCM.

Based on the technical analyses, we believe that the overall performance of the reformulated products in each category will be similar to the performance of their higher VOC counterparts. Except for the adhesion promoter and pretreatment coating categories, complying products are commonly available and currently being used. However, we will conduct technology reviews for the proposed VOC limits that are lower than the most stringent limits in existing district rules prior to the effective date of those limits.

In this chapter, we provide a discussion of the automotive coating categories and the solvents included in the proposed SCM. The coating categories are adhesion promoter, clear coating, color coating, multi-color coating, pretreatment coating (formerly called pretreatment wash primer), primer, single-stage coating (formerly called topcoat), temporary protective coating, truck bed liner coating, underbody coating, uniform finish coating, and any other coating type.

Appendix D discusses categories that are currently in district rules or the national rule, but which are not specifically listed in the proposed SCM. These coating categories are multi-stage topcoat system, specialty coating, metallic/iridescent, primer sealer, primer surfacer, camouflage, precoat, extreme performance coatings, elastomeric material, anti-glare safety coating, impact resistant coating, water hold-out coating, weld-thru coating, bright metal trim repair, gloss flatteners, heat resistant, and jamming (cut-in) clear coat.

The structure of the proposed SCM differs significantly from existing district rules. Currently, the district rules and the U.S. EPA automotive coatings rule allow for a composite VOC limit for “multi-stage topcoat” systems. The SCM replaces the composite VOC limit with specific VOC limits for clear and color coatings.

Also, the proposed SCM eliminates the distinction between Group I and Group II vehicle categories, and establishes the same VOC limits for coatings used on passenger vehicles, heavy-duty vehicles, and mobile equipment. The SCM will clarify and, where applicable, combine coating categories. The SCM eliminates the specialty coatings category and replaces it with specific category limits as needed. The 2002 Survey data indicated that several of the coating types currently allowed under the specialty coatings category are no longer sold in California.

Most of the coatings have two or more individual components that are combined into one formulation. For example, a color coating may be a combination of up to ten individual toners plus hardeners, reducers, and specialty additives. As such, we cannot determine the volume applied of any single mixture. For an estimate of the emissions from each coating category, we assumed that an equal amount of base material was used in every formulation that could be made with that base material.

ARB staff analyzed the survey data to propose appropriate VOC limits, as listed in Chapter III, Table III-1. Table IV-1 shows the number of companies that reported coatings that meet the proposed VOC limits in the SCM. Table IV-2 shows coating categories found in the existing district rules and their corresponding category in the proposed SCM.

Table IV-1 - Compliance Summary

	Coating Category										
Number of Companies that:	Adhesion Promoter	Clear	Color ***	Multi-color	Pretreatment	Primer	Single Stage ***	Temporary Protective	Truck Bed Liner	Underbody	Uniform Finish
Sold type of coating in CA	5	15	12	0	13	15	13	2	1	3	5
Reported mixtures	4	14	11	0	11	14	10	2	1	3	3
Reported valid mixtures *	4	14	11	0	11	14	10	2	1	3	3
Reported compliant mixtures **	0	11	5	0	0	12	1	1	1	2	1

17 companies responded to survey.

* Mixtures are considered valid if ARB has all necessary information for all components of the mixture and the information for each component met ARB standards.

** Mixtures that meet the VOC limits proposed in the SCM.

*** Single-Stage and Color Coatings are reported for systems and not individual mixtures.

Table IV-2 - Comparison of Coating Categories	
Existing District Categories	SCM Categories
Camouflage	Color Coating
Extreme Performance	Primer, Color Coating, Clear Coating, Single-Stage Coating, or Underbody Coating
General Topcoat	Single-Stage Coating
Metallic/Iridescent Topcoat	Single-Stage Coating
Multi-Color Multi-stage	Multi-Color Coating
Multi-Color Topcoat	Multi-Color Coating
Multi-stage Topcoat (aka Multi-stage Topcoat System)	Color Coating & Clear Coating
Precoat	Primer
Pretreatment Wash Primer (aka Pretreatment or Pretreatment Coating)	Pretreatment Coating
Primer	Primer
Primer Sealer	Primer
Primer Surfacer	Primer
Rubberized Asphaltic Underbody	Underbody Coating
Single-Stage Nonmetallic/Noniridescent Topcoat	Single-Stage Coating
Single-Stage Metallic/Iridescent Coating	Single-Stage Coating
Solid Color Topcoat	Single-Stage Coating
Temporary Protective Coating	Temporary Protective Coating
Topcoat (aka All Other Topcoats)	Single-Stage Coating
Specialty Coatings	The generic category has been eliminated and replaced with specific categories for the various coatings previously grouped together and are addressed below.
Adhesion promoter	Primer or Adhesion Promoter
Anti-glare Safety Coating (aka Antiglare/Safety Coatings)	Clear Coating, Color Coating, or Single-Stage Coating
Bright Metal Trim Repair Coating	Any Other Coating Type
Camouflage	Color Coating
Elastomeric Materials (aka Elastomeric Coatings)	Primer, Color Coating, Clear Coating, Single-Stage Coating, or Underbody Coating
Extreme Performance	Primer, Color Coating, Clear Coating, Single-Stage Coating, or Underbody Coating
Gloss Flatteners (aka Low-Gloss Coatings)	Clear Coating
Heat Resistant	Primer, Color Coating, Clear Coating, or Single-Stage Coating
Impact Resistant Coating	Single-Stage Coating, Clear Coating,

Table IV-2 - Comparison of Coating Categories	
Existing District Categories	SCM Categories
	Underbody Coating, or Truck Bed Liner Coating
Jamming (Cut-In) Clear Coats	Clear Coating
Multi-Color Coatings	Multi-Color Coatings
Rubberized Asphaltic Underbody Coating	Underbody Coating
Uniform Finish Blenders (aka Finish Blenders)	Uniform Finish Coating
Water Hold-Out Coating	Primer
Weld-Thru Coatings (aka Weld-Thru Primers and Weld-Through Primer)	Primer

B. CATEGORIES THAT ARE IN THE SCM

This section describes each of the categories in the SCM. Chapter V, Table V-3, details the estimated emissions and anticipated emission reductions, in tpd, from each category in the proposed SCM. Table IV-3, at the end of this section, provides basic physical parameters for each coating category in the proposed SCM. Table IV-4 shows the number of compliant mixtures and complying marketshare for each coating category as of 2001. All averages expressed in this chapter are simple, arithmetic averages.

1. Adhesion Promoter

Adhesion promoters are coatings applied directly to uncoated plastic surfaces to facilitate bonding of subsequent coatings. All adhesion promoter mixtures reported in the 2002 Survey are solvent-borne coatings. None of the mixtures reported contain any water or exempt compounds. Other than resins, the solids include pigments and various other compounds. These include proprietary compounds, titanium dioxide, talc, and barium sulfate.

The proposed VOC limit of 540 g/l is technologically and commercially feasible by the January 1, 2009, effective date based on discussions with coating manufacturers. Manufacturers may increase the exempt compound content in order to comply with the proposed VOC limit. Five companies reported selling adhesion promoter coatings in the 2002 Survey. None of the four companies that reported complete and valid information for adhesion promoters have coatings that meet the proposed limit. One coating manufacturer has stated that they expect to have a product that meets the proposed VOC limit in the market by 2008.

Issues:

1. Issue: No product currently meets the proposed limit.

Response: Manufacturers may add exempt compounds to their coatings to meet the proposed VOC limit.

Below is a sample formulation of a compliant adhesion promoter. This is intended to illustrate how the VOC content could be lowered to meet the proposed VOC limit. In developing this formulation, we relied on nearly compliant formulations of existing mixtures and increased the amount of exempt compounds. The volume percent is derived from the weight percent and individual densities of compounds in the coating formulation. To protect data confidentiality, the formula below groups various solids and VOCs together.

Ingredient	Wt %	Vol %
resin	19	17.4
solids	18	5.9
TBAC (or other exempts)	29.5	35.5
VOCs	33.5	41.2
total	100	100
solids	37	23.3
exempts	29.5	35.5
VOC	33.5	41.2
overall density (g/cm3)	1.04	
VOC limit	540	g/l
VOCreg	539.0	g/l
VOCact	347.6	g/l

This is a small usage category, about 3,600 gallons in 2001. If compliant products are formulated with TBAC, the emissions of TBAC from this coating category would be only 25 lbs per day statewide. Exempts other than TBAC could be used to achieve the same VOC content.

2. Clear Coating

Clear coatings are coatings that contain no pigments and are applied over a color coating or clear coating. All clear coating mixtures reported in the 2002 Survey are solvent-borne coatings. The coatings employ a variety of solvents that manufacturers mix to vary the rate of evaporation of the carrier (solvent). Many of the mixtures reported contain trace to minor amounts of water.

Over half of the mixtures reported contain exempt compounds. In those mixtures, the exempt content, by weight, ranges from about one-half percent up to sixty-six percent. Overall, the average exempt compound content is about nine percent by weight.

The majority of the solid content of a clear coating is resin. Some clear coatings have materials such as talc and silica to disperse light and create a matted appearance. Other clear coatings have plasticizers or flexibilizing agents added to create an elastomeric coating. Other than resins, the solids include proprietary compounds, silica, ultra-violet light absorbers, light stabilizers, and many other compounds in minor amounts.

The proposed VOC limit of 250 g/l is technologically and commercially feasible by the January 1, 2009, effective date. The SCAQMD Rule 1151 requires that all manufacturers who offer clear coatings for sale in the district offer at least one product line with a VOC content of 2.1 lbs/gal (250 g/l) or less. Fifteen companies reported selling clear coatings in the 2002 Survey. Eleven of the fourteen companies that reported complete and valid information for clear coatings have coatings that meet the proposed limit.

Issues:

1. Issue: Low gloss/matted clears need a higher VOC limit to accommodate the additives that are used to disperse light.

Response: Manufacturers currently add a flattening agent to a high gloss clear coating to achieve a low gloss coating. This formulation approach results in an unnecessarily high VOC content. The VOC content of low gloss clear coatings could be reduced to 250 g/l if products are formulated directly as low gloss products.

Issue: Elastomeric clears need a higher VOC limit.

Response: The ARB has been informed that elastomeric/flex additives are currently available at 1.9 lb/gal (228 g/l) which would enable an elastomeric clear coating to achieve the 250 g/l VOC limit.

3. Issue: Compliant solvent-borne clear coatings have not been tested for compatibility with water-borne color coatings.

Response: The ARB has found manufacturer data sheets that indicate that at least two companies market 250 g/l clear coatings that are compatible with their respective water-borne color coating systems. The PPG Corporation stated at the fourth public workshop in Oakland that it has a compliant solvent-borne clear coating that is marketed for use with its water-borne color coatings.

3. Color Coating

Color coatings are pigmented coatings, excluding adhesion promoters, primers and multi-color coatings, that require a subsequent clear coating. Color coatings include metallic/iridescent color coatings. These coatings were previously called basecoats and midcoats as part of the multi-stage systems in district rules. These coatings require a subsequent clear coating for protection, durability, and gloss.

Two companies reported sales of water-borne systems in the 2002 Survey. Another company reported three specific water-borne mixtures. All other coatings in this category are solvent-borne. Many mixtures reported contain trace to minor amounts of water. Exempt compounds are in about half of the mixtures reported. In those mixtures with exempt compounds, the amount of exempt compounds ranged from one-tenth of a percent to seventy-three percent by weight. Overall, the average amount of exempt compounds was three percent by weight.

This is the largest emitting category of automotive coatings. Color coatings account for about 60 percent of the VOC emissions from automotive coatings. Other than resins, the solids include pigments and various other compounds. These include titanium dioxide, mica, nickel compounds, iron compounds, rutile, aluminum, silica, carbon black, molybdenum compounds, tin compounds, barium sulfate, copper compounds, and numerous other compounds.

Most of the major manufacturers have water-borne color coatings that have been developed to comply with European Union (EU) emission standards. The EU directive will require all manufacturers to meet a 420 g/l VOC limit for color coatings as of January 1, 2007. The EU does not allow the use of exempt compounds to comply with the VOC content limit. Consequently, manufacturers have developed water-borne technologies to meet the EU VOC limit.

Based on discussions with manufacturers, they intend to use these water-borne systems to comply with the proposed SCM VOC limit. Thus, the proposed VOC limit of 420 g/l is technologically and commercially feasible by the January 1, 2009, effective date. Twelve companies reported selling color coatings in the 2002 Survey. Six of the eleven companies that reported complete and valid information for color coatings have solvent-borne systems that meet the proposed limit currently in use in California. However, these solvent-borne systems are only used for fleet vehicles, not for passenger vehicles that have greater performance demands.

If manufacturers choose to comply with the color coating limit with water-borne coatings, this will be a significant change from the current use of high VOC solvent-borne coatings. It will likely require changes by the end users, including the addition of air movement equipment to quickly dry the water-borne coatings and perhaps heat to maintain current production levels.

4. Multi-Color Coating

Multi-color coatings are coatings that exhibit more than one color in the dried film after a single application, are packaged in a single container, and hide surface defects on areas of heavy use. These coatings are commonly called “splatter” coatings due to their appearance. They are more commonly used in industrial settings and on items such as small fishing boats.

No coatings in this category were reported as being sold in California in 2001. We have found this type of coating marketed on the internet, with one of the listed uses being automotive. We have assumed that everyone who markets this coating is in compliance with the current national limit.

The proposed VOC limit of 680 g/l is technologically and commercially feasible. The proposed limit is the same as the current limit of 680 g/l in the National Volatile Organic Compound Emission Standards for Automobile Refinish Coatings, 40CFR59, Sections 59.100 through 59.111, and Table 1 to Subpart B.

5. Pretreatment Coating

Pretreatment coatings contain a minimum of one-half (0.5) percent acid by weight to provide surface etching, and not more than 16 percent solids by weight. They are applied directly to bare metal surfaces to provide corrosion resistance and adhesion. The SCAQMD and Antelope Valley AQMD are the only districts that limit the solids content of pretreatment coatings. Limiting the solids content is intended to reduce film build from a pretreatment coating, thereby reducing the incentive to use a high VOC content material as a primer able to fill large scratches or voids.

All of the reported mixtures in the 2002 Survey are solvent-borne. Of the 57 reported mixtures, 48 mixtures contain negligible to minor amounts of water. Water content ranges up to almost four percent by weight. Of the 57 reported mixtures, 43 mixtures do not contain any exempt compounds. Six mixtures have about one percent exempt compounds by weight and the remainder of mixtures range from two percent up to 15 percent exempt compounds by weight. Of the coatings that meet the solids content provision of the SCM, most do not use any exemptions. The maximum exempt content found in the coatings that meet the solids content provision is approximately six percent. Other than resins, the solids include pigments and various other compounds. These include titanium dioxide, talc, zinc compounds, iron oxide, calcium carbonate, zinc phosphate, silica, and numerous other compounds. The primary acid used is phosphoric acid.

ARB staff believes the proposed VOC limit of 660 g/l is technologically and commercially feasible by the January 1, 2009 effective date based on discussions with the coating manufacturers (current limit is 780 g/l). One coating manufacturer has stated that they expect to have a pretreatment coating that meets the proposed limit on the market by the end of 2005.

One mixture reported in the 2002 Survey had a VOC content of 660 g/l, however, its solids content was greater than 16 percent, by weight. We believe it is possible for manufacturers to increase the exempt compound content in order to comply with the proposed VOC limit. Thirteen companies reported selling pretreatment coatings in the 2002 Survey. Eleven companies reported complete and valid information for pretreatment coatings, however, none have coatings that meet the proposed limit.

Issues:

1. Issue: No product currently meets the proposed limit.

Response: ARB staff believes that the manufacturers have time to reformulate their coatings to meet the proposed limit. Because no products currently meet the proposed VOC limit, we will conduct a technology assessment approximately one year before the effective date of the limit.

Below is a sample formulation of a compliant pretreatment coating. This is intended to illustrate how the VOC content could be lowered to meet the proposed VOC limit. In developing this formulation, ARB staff relied on nearly compliant formulations of existing mixtures and increased the amount of exempt compounds. The volume percent is derived from the weight percent and individual densities of compounds in the coating formulation. To protect data confidentiality, the formula below groups various solids and VOCs together for display.

Ingredient	Wt %	Vol %
Resin	5.5	4.4
Solids	9.1	2.5
phosphoric acid	1.4	0.8
Acetone (or other exempts)	7.5	8.6
TBAC (or other exempts)	41.5	43.5
VOCs	35	40.3
Total	100	100
Solids	16	7.7
Exempts	49	52.1
VOC	35	40.3
overall density (g/cm3)	0.90	
VOC limit	660	g/l
VOCreg	659.4	g/l
VOCact	316.0	g/l

This is a small usage category, about 45,000 gallons in 2001. If compliant products were formulated with TBAC, the emissions of TBAC from this coating category would be less than 400 lbs per day statewide.

6. Primer

The primer category currently exists in district rules. The SCM retains it and expands it to include the current district coating categories of primer surfacers and primer sealers. Most districts have the same VOC limit for primers and primer surfacers. Currently, the VOC limit for primer sealers is slightly higher (e.g., 340 g/l in SCAQMD). Primers are coatings applied to a substrate to provide:

- 1) A bond between the substrate and subsequent coats;
- 2) Corrosion resistance;
- 3) A smooth substrate surface; or
- 4) Resistance to penetration of subsequent coats. Some primers are pigmented to allow the painter to use less color coating to achieve the desired color.

The vast majority of primers reported in the 2002 Survey are solvent-borne, with only a small percentage being water-borne. One mixture of primer, four mixtures of sealer, 14 mixtures of surfacer, and one mixture of precoat are water-borne. All other mixtures reported are solvent-borne.

Almost 75 percent of the primers reported contain exempt compounds. For those mixtures with exempt compounds, the exempt content ranges from one-tenth of a percent to almost 64 percent, by weight, with the average exempt content being just under six percent.

The resin content varies widely within the primer category depending upon usage and manufacturer, from a low of 0.2 percent to a high of 57 percent, by weight, both of which are in the surfacer subcategory. Most primers have approximately 20 to 29 percent resin, by weight. Other than resins, the solids include pigments and various other compounds. These include barium sulfate, talc, titanium dioxide, calcium carbonate, zinc phosphate, mica, clay, aluminum, iron oxide, magnesium carbonate, and numerous other compounds.

The proposed VOC limit of 250 g/l is technologically and commercially feasible by the January 1, 2009, effective date. SCAQMD's Rule 1151 already requires all primers, primer surfacers, and primer sealers used on large vehicles and mobile equipment to meet a VOC content of 250 g/l. Fifteen companies reported selling primers in the 2002 Survey. Twelve of the 14 companies that reported complete and valid information for primers have coatings that meet the proposed limit.

Issues:

During the SCM development process, manufacturers requested a 340 g/l VOC limit for sealers. The reasons cited for the need for a higher VOC limit and our responses are discussed below.

1. Issue: Sealers have a lower solids content than surfacers and therefore cannot meet the same limit.

Response: ARB staff analyzed the solids content of surfacers and sealers and found that while there were differences between the solids contents for any given manufacturer, the differences were insignificant when compared to the differences between manufacturers. The ranges for any given manufacturer overlapped, as well as between manufacturers. One manufacturer has stated that it will not be difficult to meet the proposed limit for sealers using exempts in the solvent mix.

2. Issue: Sealers have less pigment and more resin than surfacers and therefore need a higher limit.

Response: ARB staff analyzed the types of solids in the sealers and surfacers and found that there is a lot of overlap between the ranges of the types of solids in sealers and surfacers. ARB staff believes that both products can meet the proposed limit. One manufacturer has stated that it will not be difficult to meet the proposed limit for sealers using exempts in the solvent mix.

7. Single-Stage Coating

Single-stage coatings are pigmented coatings, excluding primers and multi-color coatings, for application without a subsequent clear coating. Single-stage coatings include metallic/iridescent single-stage coatings. This is an older coating technology that is diminishing in usage in the collision repair industry. It is being replaced by color coating/clear coating systems that use less material and provide a higher gloss with a more durable finish. Single-stage coatings are used mostly in production shops where the entire vehicle is painted, and a single coating can achieve the desired color, protection and durability in one application.

All but two of the reported mixtures of single-stage coatings in the 2002 Survey are solvent-borne. Only about four percent of reported mixtures contain water. For most of these mixtures, the water content is negligible. Four mixtures contain significant amounts of water, ranging from 25 to 55 percent, by weight.

Over half of the mixtures reported do not contain any exempt compounds. In the remaining mixtures the exempt content, on a mass basis, increases gradually from 0.5 percent up to a maximum exempt content of 61 percent, by weight.

Other than resins, the solids include pigments and various other compounds. These include mica, titanium dioxide, iron oxide, talc, copper compounds, aluminum, barium sulfate, carbon black, silica, nickel compounds, and numerous other compounds.

The proposed VOC limit of 340 g/l is technologically and commercially feasible by the January 1, 2009, effective date. SCAQMD Rule 1151 currently requires all single-stage coatings used on large vehicles and mobile equipment to meet a VOC limit of 340 g/l. The proposed SCM extends the 340 g/l VOC limit in SCAQMD to all vehicles, including passenger cars. Thirteen companies reported selling single-stage coatings in the 2002 Survey. One of the ten companies that reported complete and valid information for single-stage coatings has a complete single-stage system that meets the proposed limit.

Issues:

1. Issue: Metallic single-stage coatings at the proposed limit do not currently exist for the automotive market.

Response: There were some metallic single-stage coatings sold in 2001 that comply with the proposed VOC limit. One manufacturer has stated that they have a complete single-stage system, including metallics, that complies with the proposed limit.

However, based on discussions with manufacturers, it appears that single-stage coatings are not a good technology for metallic coatings. Currently, pearl or iridescent coatings are only achieved by using a color coating/clear coating technology. It appears that the best way to achieve a metallic coating is to use a color coating/clear coating technology. This is due to the way the paint film is created in single-stage coatings. The metallic flakes are not spread evenly throughout the film and reside only near the surface of the film making them more susceptible to damage, both mechanical and chemical. This would alter the appearance of the paint. Whereas in a color coating/clear coating system, the metallic flakes are fully protected by the clear coating.

8. Temporary Protective Coating

Temporary protective coatings are coatings used to temporarily protect areas from overspray or mechanical damage. These coatings are commonly used instead of taping off an area before painting another area or applied prior to shipping a vehicle. These coatings are removed after a primer or topcoat application, or after a vehicle reaches its destination.

Both of the reported mixtures of temporary protective coatings in the 2002 Survey are water-borne. Neither of the mixtures reported contains any exempt compounds. Other than resins, the solids include pigments and various other compounds.

The proposed VOC limit of 60 g/l is technologically and commercially feasible by the January 1, 2009, effective date. Several district rules currently require temporary protective coatings to meet a VOC limit of 60 g/l. Two companies reported selling temporary protective coatings in the 2002 Survey. One of the two companies that reported complete and valid information for temporary protective coatings has a coating that meets the proposed limit.

9. Truck Bed Liner Coating

Truck bed liner coatings are coatings for application to a truck bed to protect it from surface abrasion. These coatings do not include clear coatings, color coatings, multi-color coatings, or single-stage coatings. These coatings are often a rubbery type of coating that provides traction and keeps materials from dinging or scratching the bed. The one reported mixture of truck bed liner coatings in the 2002 Survey is solvent-borne. It contains no water or exempt compounds. Other than resins, the solids include pigments and various other compounds.

The proposed VOC limit of 310 g/l is technologically and commercially feasible by the January 1, 2009, effective date. One company reported selling truck bed liner coatings in the 2002 Survey. The company reported complete and valid information, and the coating meets the proposed VOC limit.

10. Underbody Coating

Underbody coatings (formerly called “rubberized asphaltic underbody coatings”) are applied to wheel wells, the inside of door panels or fenders, the underside of a trunk or hood, or the underside of the motor vehicle itself. The coatings are typically used for sound deadening or protection. ARB staff changed the name of the category to “Underbody Coating” and modified the definition to also include coatings with a similar purpose that do not contain rubberized asphalt.

Only four districts define this type of coating, and some districts do not list it as a specialty coating in their specialty coating definition. Of the four districts that define this type of coating, three districts have it specifically listed as a specialty coating. Sacramento Metropolitan AQMD has a limit of 540 g/l for these coatings.

Five of the six mixtures reported are solvent-borne; the remaining mixture is water-borne. None of the solvent-borne coatings contain any water. None of the reported mixtures, whether solvent-borne or water-borne, contain any exempt compounds.

Other than resins, the solids include pigments and various other compounds. These include talc, calcium carbonate, titanium dioxide, and iron oxide.

The proposed VOC limit of 430 g/l is technologically and commercially feasible by the January 1, 2009, effective date based on data provided by the coating manufacturers. Three companies reported underbody coatings in the 2002 Survey. Three companies reported complete and valid information and two companies have coatings that meet the proposed limit.

11. Uniform Finish Coating

Uniform finish coatings are coatings applied to the area around a spot repair for the purpose of blending a repaired area’s color or clear coating to match the appearance of an adjacent area’s existing coating. While all districts except for one identify this as a specialty coating, only five districts and the national rule define the coating.

All of the coatings reported as uniform finish coatings in the 2002 Survey are solvent-borne. None of the reported mixtures contain any water. Only two mixtures contain exempt compounds. Both of these mixtures contain about ten percent exempt compounds by weight. The non-resin portion of the solids is composed of pigment and other solids.

The proposed VOC limit of 540 g/l is technologically and commercially feasible by the January 1, 2009, effective date based on data provided by the coating manufacturers. Five companies reported uniform finish coatings in the 2002 Survey. Three companies reported complete and valid information and two of the companies have coatings that meet the proposed limit.

12. Any Other Coating Type

This category is for any coating that does not fit into the specified coating categories. It was created so that if such a coating existed it would not be exempt from the VOC content limits. Currently, we are unaware of any coating that would be in this category. The proposed VOC limit of 250 g/l was set to preserve the emission reductions from the proposed SCM.

Table IV-3 - Basic Physical Parameters				
		Minimum	Maximum	Average
Adhesion Promoter	Volume % Solids	1.1	35.8	14.3
	Weight % Solids	1.0	51.8	20.3
	Weight % Resin	1.0	12.5	3.6
	VOC actual (g/l)	579	857	745
	VOC regulatory (g/l)	579	857	745
Clear Coating	Volume % Solids	2.7	72.3	41.5
	Weight % Solids	3.6	76.5	46.9
	Weight % Resin	3.4	73.9	37.4
	VOC actual (g/l)	29	840	429
	VOC regulatory (g/l)	82	840	464
Color Coating	Volume % Solids	0.7	92.8	25.7
	Weight % Solids	2.7	94.0	34.3
	Weight % Resin	0.8	93.2	29.1
	VOC actual (g/l)	62	883	602
	VOC regulatory (g/l)	63	883	626
Multi-Color Coating	No information was reported.			
Pretreatment Coating	Volume % Solids	2.9	17.8	11.6
	Weight % Solids	3.8	34.0	23.9
	Weight % Resin	1.4	13.9	6.2
	VOC actual (g/l)	579	933	721
	VOC regulatory (g/l)	660	933	736
Primer	Volume % Solids	3.8	85.8	38.8
	Weight % Solids	4.5	84.3	56.5
	Weight % Resin	0.2	56.7	25.4
	VOC actual (g/l)	5	831	477
	VOC regulatory (g/l)	12	831	502
Single-Stage Coating	Volume % Solids	7.6	82.0	33.6
	Weight % Solids	10.0	86.4	41.5
	Weight % Resin	8.2	73.2	28.3
	VOC actual (g/l)	69	797	543
	VOC regulatory (g/l)	87	829	561
Temporary Protective Coating	This information is proprietary.			
Truck Bed Liner	This information is proprietary.			

Table IV-3 - Basic Physical Parameters				
		Minimum	Maximum	Average
Coating				
Underbody Coating	Volume % Solids	24.0	41.4	28.7
	Weight % Solids	31.9	55.0	39.7
	Weight % Resin	15.4	20.0	17.5
	VOC actual (g/l)	25	597	466
	VOC regulatory (g/l)	46	597	469
Uniform Finish Coating	Volume % Solids	2.8	35.7	32.4
	Weight % Solids	3.7	41.0	36.9
	Weight % Resin	3.6	38.3	34.3
	VOC actual (g/l)	464	827	573
	VOC regulatory (g/l)	524	827	584
Any Other Coating Type	No information was reported.			

Table IV-4 - Technical Feasibility		
	Number of Currently Complying Mixtures	Estimated Currently Complying Market Share (percent)
Adhesion Promoter	0	0
Clear Coating	33	8 - 26
Color Coating Systems	8 (6 fleet)	8
Multi-Color Coating	NA	NA
Pretreatment Coating	0	0
Primer	99	40 - 45
Single-Stage Coating Systems	1	NR
Temporary Protective Coating	P	P
Truck Bed Liner Coating	P	P
Underbody Coating	P	P
Uniform Finish Coating	P	P
Any Other Coating Type	NA	NA

NA - Information not available

NR - Volumes not reported

P - Proprietary information

C. SOLVENTS

Solvents, as the term is used in the SCM, are cleaning solutions that contain VOCs. While most districts regulate solvents used for cleaning operations in their automotive coating rules, a couple of districts (e.g., SCAQMD) have separate rules for cleaning solvents. ARB is addressing solvents used in automotive coating cleaning operations as part of the SCM.

Most district rules divide solvents into two categories: surface preparation and cleanup, and application equipment cleaning. These solvent categories typically have different VOC limits, with application equipment cleaning being given a higher VOC limit. Some districts further divide surface preparation solvents into those used to clean plastic parts and all other surface preparation solvents. In these cases, the plastic parts cleaners are given higher VOC limits than the non-plastic parts cleaners. A few districts provide a separate and higher VOC limit for solvents applied from hand-held spray containers. A few districts provide a separate and higher VOC limit for solvents used to clean road tar, engine oil, grease, overspray, and adhesives.

The proposed VOC limit of 25 g/l is technologically and commercially feasible by the January 1, 2009, effective date. The SCAQMD Rule 1171, requires all solvents used for cleaning at automotive coatings operations to meet a 25 g/l VOC limit as of July 1, 2005. There are solvents available that meet the 25 g/l VOC limit through the use of exempt compounds. The SCM would extend the existing SCAQMD limit to the rest of the State.

REFERENCES

California Air Resources Board 2002 Automotive Coatings Survey data.

Code of Federal Regulations Title 40 Part 59 – National Volatile Organic Compound Emission Standards for Consumer and Commercial Products, Sections 59.100 through 59.111 and Table 1 to Subpart B.

Antelope Valley Air Quality Management District Rule 1151 – Motor Vehicle and Mobile Equipment Coating Operations.

Bay Area Air Quality Management District Regulation 8 – Organic Compounds, Rule 45 – Motor Vehicle and Mobile Equipment Coating Operations.

Butte County Air Quality Management District Rule 235 – Requirements for Vehicle and Mobile Equipment Coating Operations.

El Dorado County Air Quality Management District Rule 230 – Automotive Refinishing Operations.

Feather River Air Quality Management District Rule 3.19 – Vehicle and Mobile Equipment Coating Operations.

Glenn County Air Pollution Control District Article IV Prohibitions, Section 105 – Vehicle and Mobile Equipment Coating Operations.

Imperial County Air Pollution Control District Rule 101 – Definitions.

Imperial County Air Pollution Control District Rule 427 – Automotive Refinishing Operations.

Kern County Air Pollution Control District Rule 410.4A – Motor Vehicle and Mobile Equipment Refinishing Operations.

Mojave Desert Air Quality Management District Rule 1116 – Automotive Refinishing Operations.

Placer County Air Pollution Control District Rule 234 – Automotive Refinishing Operations.

Sacramento Metropolitan Air Quality Management District Rule 459 – Automotive, Truck & Heavy Equipment Refinishing Ops.

San Diego County Air Pollution Control District Rule 67.20 – Motor Vehicle and Mobile Equipment Refinishing Operations.

San Joaquin Valley Unified Air Pollution Control District Rule 4602 – Motor Vehicle and Mobile Equipment Coating Operations.

San Luis Obispo County Air Pollution Control District Rule 423 – Motor Vehicle and Mobile Equipment Coating Operations.

Santa Barbara County Air Pollution Control District Rule 339 – Motor Vehicle and Mobile Equipment Coating Operations.

Shasta County Air Quality Management District Rule 3:25 – Vehicle and Mobile Equipment Coating Operations.

South Coast Air Quality Management District Rule 1151 – Motor Vehicle and Mobile Equipment Non-Assembly Line Coating Operations.

Tehama County Air Pollution Control District Rule 4:35 – Vehicle and Mobile Equipment Coating Operations.

Ventura County Air Pollution Control District Rule 74.18 – Motor Vehicle and Mobile Equipment Coating Operations.

Yolo-Solano Air Quality Management District Rule 2.26 – Motor Vehicle and Mobile Equipment Coating Operations.

Confidential conversations with paint manufacturers regarding proprietary information related to product development.